

ABSTRACT OF THE DISCLOSURE

RICE *MLH1* ORTHOLOG AND USES THEREOF

5 Compositions and methods for inhibiting the cellular mismatch repair system in a plant host cell are provided. Compositions include the cDNA and amino acid sequence of a rice *MLH1* ortholog. The nucleic acid molecules and proteins of the invention find use in increasing the efficiency of targeted gene mutation and homologous recombination in plants via inhibition of the plant cellular mismatch repair system. The plant cellular mismatch repair system is inhibited through the use of transposon tagging of a *MLH1* gene, sense- and antisense-suppression of a *MLH1* gene, antibody binding to a MLH1 polypeptide or variant polypeptide, targeted mutagenesis of specific amino acid residues of a plant *MLH1* gene, and competition with a mismatch repair impaired MLH1 polypeptide through transgeneic over-expression of the impaired polypeptide. Also provided are transformed plant cells, plant tissues, plants, and seeds. Additional methods that are provided include the detection of as little as one base pair mismatch in a DNA duplex and the generation of plants with reversible male sterility for applications in hybrid generation.